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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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	Application No.	Applicant(s)
Office Action Summary	10/586,997	FUJII ET AL.
	Examiner	Art Unit	
	TAHMINA ANSARI	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>21 July 2006</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>21 July 2006</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>07/21/2006, 05/09/2008</u>.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

1. Claims 1-20 are pending in this application.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3.   Claims 17-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 17 defines "a program which causes a computer to function as an electronic watermark embedding apparatus" embodying functional descriptive material (i.e., a program which causes a computer to function). However, the claim does not define a "computer-readable medium or computer-readable memory" and is thus non-statutory for that reason (When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program.

Claim 18 defines "a program which causes a computer to function as an electronic watermark detecting apparatus" embodying functional descriptive material (i.e., a program which causes a computer to function). However, the claim does not define a "computer-readable medium or computer-readable memory" and is thus non-statutory for that reason (When functional descriptive material is recorded on some computer-readable medium it becomes structurally

and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program.

Claims 19-20 are dependent upon claim 18 and fail to overcome the problem recited for claim 18.

The examiner suggests amending the claims to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Objections

4.   Claims 7-12, 14-16 and 18-20 are objected to because of minor informalities. Appropriate correction is required. The are objected to for their recitation of the following limitations:

Consider Claim 7:

Claim 7, lines 12-21, page 56 recites a limitation to determine a correlation and is unclear as to whether the correlation is between the same values or different

values, as exemplified by the following: "a correlation detection step of detecting

a correlation value showing a correlation **between a pattern of the pixel value**

variation in the time direction which is produced between the pixel values in

the one of said plurality of image regions and those in the adjacent one of said

plurality of image regions, which is caused by the electronic watermark to be

embedded **in said electronic image from which the electronic watermark is**

to be detected, and a pattern of the pixel value variation in the time

direction of said electronic image from which the electronic watermark is to

be detected".

Likewise, claims 8-12 are dependent upon claim 7 and fail to overcome the

problem recited for claim 7.

Consider Claim 14:

Claim 14, lines 18-27, page 60 recites a limitation to determine a correlation and

is unclear as to whether the correlation is between the same values or different

values, as exemplified by the following: "a correlation detection step of detecting

a correlation value showing a correlation **between a pattern of the pixel value**

variation in the time direction which is produced between the pixel values in

the one of said plurality of image regions and those in the adjacent one of said

plurality of image regions, which is caused by the electronic watermark to be

embedded **in said electronic image from which the electronic watermark is**

to be detected, and a pattern of the pixel value variation in the time

direction of said electronic image from which the electronic watermark is to be detected".

Likewise, claims 15-16 are dependent upon claim 14 and fail to overcome the problem recited for claim 14.

Consider Claim 18:

Claim 18, lines 8-17, page 63 recites a limitation to determine a correlation and is unclear as to whether the correlation is between the same values or different values, as exemplified by the following: "a correlation detection step of detecting a correlation value showing a correlation *between a pattern of the pixel value variation in the time direction* which is produced between the pixel values in the one of said plurality of image regions and those in the adjacent one of said plurality of image regions, which is caused by the electronic watermark to be embedded *in said electronic image from which the electronic watermark is to be detected, and a pattern of the pixel value variation in the time direction of said electronic image from which the electronic watermark is to be detected".*

Likewise, claims 19-20 are dependent upon claim 18 and fail to overcome the problem recited for claim 18.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

6.   Claims 8-12, 15-16 are further rejected under 35 U.S.C. 112, second paragraph,

as being indefinite for the following reasons.

There are insufficient antecedent bases for the following limitations.

-   Claims 8, 9, 10, 11, and 12 recite the limitation "the electronic watermark

    embedding method according to Claim 7" in lines 27-28 page 57, lines 5-6

    page 58, lines 18-19 page 58, lines 23-24 page 58, and lines 29-30 page 58,

    respectively. However, Claim 7 does not claim an "electronic watermark

    embedding method"; rather it claims an "electronic watermark detecting

    method" leading to indefiniteness.

-   Claims 15 and 16 recite the limitation "the electronic watermark embedding

    apparatus according to Claim 14" in lines 4-5 page 61, and lines 12-13 page

    61, respectively. However, Claim 14 does not claim an "electronic watermark

    embedding apparatus"; rather it claims an "electronic watermark detecting

    apparatus" leading to indefiniteness.

7.   Claims 1-6, 13 and 17 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite in that it fails to point out what is included or excluded by the claim

language.

The claims are omnibus type claims and encompass multiple embodiments.

- Claim 1, is an omnibus type claim, as is exemplified in lines 17-21, page 55, which claims making the variation in the pixel values of said adaptive pixels vary at a boundary between the two image regions "*and/or*" in the time direction. Claim 1 thus encompasses three embodiments.

- Claims 2-6 are dependent upon Claim 1 and fail to overcome the problem recited for claim 1.

- Claim 13, is an omnibus type claim, as is exemplified in lines 24-29, page 59, which claims making the variation in the pixel values of said adaptive pixels vary at a boundary between the two image regions "*and/or*" in the time direction. Claim 13 thus encompasses three embodiments.

- Claim 17, is an omnibus type claim, as is exemplified in lines 14-19, page 62, which claims making the variation in the pixel values of said adaptive pixels vary at a boundary between the two image regions "*and/or*" in the time direction. Claim 17 thus encompasses three embodiments.

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9.   Claims 1-4, 6, 13 and 17-20 are rejected under 35 U.S.C. 102(b) as being

anticipated by Noridomi et al. (US PGPub US 2003/0210784 A1), hereby referred to as

"Noridomi".

Consider Claim 1:

Noridomi teaches

- a; "An electronic watermark embedding method comprising" **(Noridomi [0101]-**

[0103], [0107], Figures 5 and 6):

- b; "a dividing processing step of dividing an electronic image into which an

electronic watermark is to be embedded into a plurality of image regions

spatially" **(Noridomi [0104], [0108], Figures 5 element 504, Figure 6 element**

601);

- c; "an adaptive extraction step of extracting, as adaptive pixels, pixels each

having a property of being difficult to visually recognize a variation in a pixel

value from each of said plurality of image regions" **(Noridomi [0105], [0109]-**

[0110], [0112], Figures 5 element 501-502, Figure 6 elements 602-604, and

607);

- d; "and an embedding step of producing a variation between the pixel values of

said adaptive pixels in one of said plurality of image regions and those of said

adaptive pixels in an adjacent one of said plurality of image regions" **(Noridomi**

[0106], [0111]-[0113], Figures 5 element 503 and 505, Figure 6 element 606-

608),

- e; "and varying the pixel values of said adaptive pixels of said plurality of image regions in a time direction, according to a value of an embedded bit set of an electronic watermark" **(Noridomi [0123]-[0126], Figures 7 and 8)**,

- f; "and of generating an electronic -watermark-embedded image by making the variation in the pixel values of said adaptive pixels vary step by step at a boundary between the two of said plurality of image regions and/or in the time direction so that the variation makes a slow transition" **(Noridomi [0101]-[0103], [0123]-[0131], Figures 5-8; when a region is embedded, every pixel including the pixels at the boundary in the region are modified; the embedding is done pixel by pixel (step by step) and suppressed degradation is a slow transition in time direction)**.

Consider Claim 2:

Noridomi teaches "The electronic watermark embedding method according to claim 1, characterized in that in the embedding step, the embedded bit set is so expressed as to vary the variation between the two image regions and/or the variation in those of said adaptive pixels in the time direction so that the pixel values of said adaptive pixels in the one of said plurality of image regions have a phase polarity different from those of said adaptive pixels in the adjacent one of said plurality of image regions" **(Noridomi [0109]-[01111], Figure 6 elements 602-608, [0133]-[0136], Figure 8 elements 801-805; embedded bit set is expressed as to vary the variation between the two image regions [image is**

divided into four regions, each of which has a plurality of sub-regions in it and the characteristic amount is representative of the sum of the luminance values in that region of sub-regions] and/or variation in the time direction [target image for watermark and entered video signal] have a phase polarity different from the adaptive pixels in the adjacent one of said plurality of image regions [each region is subject to having a different characteristic amount because it is represented by the sum of the local luminance values]).

Consider Claim 3:

Noridomi teaches "The electronic watermark embedding method according to claim 1, characterized in that in the adaptive extraction step, pixels each having a brightness level which is difficult to recognize visually even if a brightness variation associated with the embedding of the electronic watermark is added thereto is extracted as the adaptive pixels" **(Noridomi [0109]-[0110], [0118]-[0120], Figures 5 and 6)**.

Consider Claim 4:

Noridomi teaches "The electronic watermark embedding method according to claim 1, characterized in that in the adaptive extraction step, pixels each having a large pixel value variation in the time direction are extracted, as the adaptive pixels, on the basis of a pixel value difference in the time direction of the

electronic image into which the electronic watermark is to be embedded"

(Noridomi [0123]-[0126], [0135]-[0140], Figures 7 and 8).

Consider Claim 6:

Noridomi teaches "The electronic watermark embedding method according to

claim 1, characterized in that in the embedding step, the embedding processing

is carried out in synchronization with a scene change which occurs in the

electronic image into which the electronic watermark is to be embedded"

(Noridomi [0136]-[0140], Figure 7 element 706, Figure 8 elements 805-806;

overlaid frame number which represents the number of frames which have

the same information successively embedded is used as the embedment

parameter and represents scene change).

Consider Claim 13:

Noridomi teaches

- a; "An electronic watermark embedding apparatus comprising" **(Noridomi**

[0101]-[0103], [0107], Figures 5 and 6):

- b; "a dividing processing unit for dividing an electronic image into which an

electronic watermark is to be embedded into a plurality of image regions

spatially" **(Noridomi [0104], [0108], Figures 5 element 504, Figure 6 element**

601);

- c; "an adaptive extraction unit for extracting, as adaptive pixels, pixels each

having a property of being difficult to visually recognize a variation in a pixel

value from each of said plurality of image regions" **(Noridomi [0105], [0109]-**

[0110], [0112], Figures 5 element 501-502, Figure 6 elements 602-604, and

607);

- d; "a watermark information generating unit for generating electronic watermark

information which produces a variation between the pixel values of said adaptive

pixels in one of said plurality of image regions and those of said adaptive pixels

in an adjacent one of said plurality of image regions, and which varies the pixel

values of said adaptive pixels of said plurality of image regions in a time

direction, according to a value of an embedded bit set of an electronic

watermark" **(Noridomi [0106], [0111]-[0113], Figures 5 element 503 and 505,**

Figure 6 element 606-608);

- e; "and an embedding processing unit for varying the pixel values of said

electronic image on the basis of said electronic watermark information and for

generating an electronic -watermark-embedded image by making the variation in

the pixel values of said adaptive pixels vary step by step at a boundary between

the two of said plurality of image regions and/or in the time direction so that the

variation makes a slow transition" **(Noridomi [0101]-[0103], [0123]-[0131],**

Figures 5-8; when a region is embedded, every pixel including the pixels at

the boundary in the region are modified; the embedding is done pixel by

pixel (step by step) and suppressed degradation is a slow transition in time

direction).

Consider Claim 17:

Noridomi teaches

- a; "A program which causes a computer to function as an electronic watermark

embedding apparatus comprising" **(Noridomi [0150], [0101]-[0103], [0107],**

Figures 5 and 6):

- b; "a dividing processing unit for dividing an electronic image into which an

electronic watermark is to be embedded into a plurality of image regions

spatially" **(Noridomi [0104], [0108], Figures 5 element 504, Figure 6 element**

601);

- c; "an adaptive extraction unit for extracting, as adaptive pixels, pixels each

having a property of being difficult to visually recognize a variation in a pixel

value from each of said plurality of image regions" **(Noridomi [0105], [0109]-**

[0110], [0112], Figures 5 element 501-502, Figure 6 elements 602-604, and

607);

- d; "a watermark information generating unit for generating electronic watermark

information which produces a variation between the pixel values of said adaptive

pixels in one of said plurality of image regions and those of said adaptive pixels

in an adjacent one of said plurality of image regions" **(Noridomi [0106], [0111]-**

[0113], Figures 5 element 503 and 505, Figure 6 element 606-608),

- e; "and which varies the pixel values of said adaptive pixels of said plurality of image regions in a time direction, according to a value of an embedded bit set of an electronic watermark" **(Noridomi [0123]-[0126], Figures 7 and 8)**,

- f; "and an embedding processing unit for varying the pixel values of said electronic image on the basis of said electronic watermark information, and for generating an electronic -watermark-embedded image by making the variation in the pixel values of said adaptive pixels vary step by step at a boundary between the two of said plurality of image regions and/or in the time direction so that the variation makes a slow transition" **(Noridomi [0101]-[0103], [0123]-[0131], Figures 5-8; when a region is embedded, every pixel including the pixels at the boundary in the region are modified; the embedding is done pixel by pixel (step by step) and suppressed degradation is a slow transition in time direction)**.

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noridomi

et al. (US PGPub US 2003/0210784 A1), hereby referred to as "Noridomi", in view of

admitted prior art.

Consider Claim 5:

Noridomi teaches:

-a; "The electronic watermark embedding method according to claim 1,

characterized in that in the adaptive extraction step, the adaptive pixels

are extracted from a portion of the electronic image into which the

electronic watermark is to be embedded" **(Noridomi [0118]-[0119];**

Noridomi teaches calculating the characteristic amount by dividing

the image into regions and using a sum of the local luminance

values, or alternatively, edge-based adaptive pixel selection

[differential absolute values of horizontally and vertically

neighboring pixels]).

Noridomi does not teach in his embodiment:

-b; "adaptive pixels are extracted from an edge portion of the electronic

image into which the electronic watermark is to be embedded".

Noridomi, however, does teach as admitted prior art:

-b; "adaptive pixels are extracted from an edge portion of the electronic

image into which the electronic watermark is to be embedded" **(Noridomi**

[0018]-[0019], [0118]-[0119]; Noridomi teaches that the prior art would

use edge-based information to determine a single characteristic

amount to embed a digital watermark).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to combine the teachings of Noridomi with the teachings of the admitted

prior art because it is desirable to have a watermarking encoding operation that

accounts for multiple characteristic features, including edge-based features. One

of ordinary skill in the art, at the time of the invention, would have been motivated

to combine the teachings of Noridomi with the teachings of the admitted prior art

in order to develop a watermark that is "difficult to analyze, capable of

suppressing degradation in image quality" **(Noridomi, [0017])**, and which can

suppress a delay in the output of an encoded image, "eliminates deviation in the

amount of digital watermark embedment-caused variations in pixel value within

the image, and provides increased digital watermark robustness" **(Noridomi,**

[0035]).

12.   Claims 7-12, 14-16, and 18-20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Noridomi et al. (US PGPub US 2003/0210784 A1), hereby referred to

as "Noridomi", in view of Oostveen et al. (WIPO Publication WO 03/055222 A2), hereby

referred to as "Oostveen".

Consider Claim 7

Noridomi teaches "an electronic watermark embedding method comprising" **(Noridomi [0101]-[0103], [0107], Figures 5 and 6)** wherein the:

- a; "electronic watermark is embedded by using a method of dividing said electronic image into which the electronic watermark is to be embedded into a plurality of image regions spatially" **(Noridomi [0104], [0108], Figures 5 element 504, Figure 6 element 601)** and,

- b; "producing a variation between pixel values in one of said plurality of image regions and those in an adjacent one of said plurality of image regions, and varying the pixel values of said adaptive pixels of said plurality of image regions" **(Noridomi [0106], [0111]-[0113], Figures 5 element 503 and 505, Figure 6 element 606-608)**, "in a time direction according to a value of the embedded bit set" **(Noridomi [0123]-[0126], Figures 7 and 8)**.

However, Noridomi does not teach

- a; "An electronic watermark detecting method of detecting an embedded bit set of an electronic watermark to be detected from an electronic image into which the electronic watermark is embedded",

- c; "characterized in that said electronic watermark detecting method comprises: a Gap detection step of detecting, as a Gap value, from which the electronic watermark is to be detected";

-d; "a correlation detection step of detecting a correlation value showing a correlation between a pattern of the pixel value variation in the time direction which is produced between the pixel values in the one of said plurality of image

regions and those in the adjacent one of said plurality of image regions, which is

caused by the electronic watermark to be embedded in said electronic image

from which the electronic watermark is to be detected, and a pattern of the pixel

value variation in the time direction of said electronic image from which the

electronic watermark is to be detected";

-e; "and an embedded bit judgment step of judging said embedded bit set from

results of the detection of said Gap value and the detection of said correlation

value for each of said plurality of image regions, and judging results of the

judgment complementarily so as to determine the embedded bit set finally".

Oostveen teaches:

- a; "An electronic watermark detecting method of detecting an embedded bit set

of an electronic watermark to be detected from an electronic image into which the

electronic watermark is embedded" **(Oostveen, page 3 lines 1-3, page 5 lines**

1-8, Figure 2 and 3; embedded bit set [robust signatures]),

- c; "characterized in that said electronic watermark detecting method comprises:

a Gap detection step of detecting, as a Gap value, a pixel value difference

corresponding to a pixel value variation in the time direction which is caused by

the embedding of the electronic watermark for each of said plurality of image

regions of said electronic image from which the electronic watermark is to be

detected" **(Oostveen, page 1 lines 11-17, page 3 lines 3-4, page 5 lines 4-10,**

Figure 2 and 3; gap value [payload]);

-d; "a correlation detection step of detecting a correlation value showing a correlation between a pattern of the pixel value variation in the time direction which is produced between the pixel values in the one of said plurality of image regions and those in the adjacent one of said plurality of image regions, which is caused by the electronic watermark to be embedded in said electronic image from which the electronic watermark is to be detected, and a pattern of the pixel value variation in the time direction of said electronic image from which the electronic watermark is to be detected" **(Oostveen, page 3 lines 5-7, page 5 lines 8-16, Figure 2 and 3; correlation between payload and signature value)**;

-e; "and an embedded bit judgment step of judging said embedded bit set from results of the detection of said Gap value and the detection of said correlation value for each of said plurality of image regions, and judging results of the judgment complementarily so as to determine the embedded bit set finally" **(Oostveen, page 3 lines 8-10, page 5, lines 15-26, Figure 2 and 3; inverse functions are used in the decoding means to decode the embedded watermark)**.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Noridomi with the teachings of Oostveen because it is desirable to have a decoding operation for a watermarking encoding operation. One of ordinary skill in the art, at the time of the invention, would have been motivated to combine the teachings of Noridomi with the teachings of

Oostveen in order to develop a watermark dependent upon "a set of robust features from the content of the host signal" in order to avoid attacks **(Oostveen, page 2 lines 1-6)**. The combination teaches providing for a unique set of features for the video signal that would present an improvement in the detection of signal to noise ratio **(Oostveen, page 2 lines 6-19)**.

Consider Claim 8:

The combination of Noridomi and Oostveen teaches "the electronic watermark embedding method according to claim 7, characterized in that in the Gap detection step, a difference between averages of pixel values of two image data located in a vicinity of noted image data in the time direction is calculated as the Gap value, the two image data being included in plural image data in the time direction which constitute the electronic image from which the electronic watermark is to be detected" **(Oostveen, page 1 lines 11-17, page 5 lines 1-16; Noridomi [0110], [0119], [0134]-[0135], [0147]; Oostveen teaches calculating a gap value [payload] and using an inverse signature-dependent function to decode the message, while Noridomi teaches encoding by using the average of pixel values of two image data located in a vicinity of noted image data in the time direction [an average of luminance components for a local region or frame] and calculating a difference)**.

Consider Claim 9:

The combination of Noridomi and Oostveen teaches "the electronic watermark embedding method according to claim 7, characterized in that in the correlation detection step, averages of pixel values of image data located in a vicinity of noted image data in the time direction are sequentially calculated as reference images, the image data being included in plural image data in the time direction which constitute the electronic image from which the electronic watermark is to be detected" **(Noridomi [0128]-[0129], [0134]-[0136], [0147]; Noridomi teaches that the embedding method uses a correlation detection step between two images in a time direction [two selected image in a video, and determines the embedment parameter based on the difference in the sum of the luminance values for the two images] and teaches that the average of pixel values [average of luminance components] can be used for embedding as well)**, "and a correlation value showing a correlation between a pattern of variations in the pixel values of these reference image and a pattern of variations in pixel values of the electronic watermark to be embedded into the electronic image from which the electronic watermark is to be detected is calculated" **(Oostveen, page 1 lines 11-17, page 5 lines 1-16; Noridomi [0128]-[0135]; Oostveen teaches correlating the gap value [payload] and the robust signatures for decoding the message using an inverse function, while Noridomi teaches correlation by calculating the difference in the pattern of variation in the pixel values of the two images [characteristic amount])**.

Consider Claim 10:

The combination of Noridomi and Oostveen teaches "the electronic watermark

embedding method according to claim 7, characterized in that in each of the Gap

detection step and the correlation detection step, a clip process of restricting the

detected value so that it falls within a range defined by upper and lower limits is

carried out" **(Noridomi [0135]-[0140], Figure 7 element 706, Figure 8 elements**

805-806; Noridomi teaches a clip process of restricting the detected value

[embedment parameter changing unit] which changes the detected value

so it falls within a range based on its comparison to that of a threshold

value).

Consider Claim 11:

The combination of Noridomi and Oostveen teaches "the electronic watermark

embedding method according to claim 7, characterized in that in each of the Gap

detection step and the correlation detection step, the detection process is carried

out in synchronization with a scene change which occurs in the electronic image

from which the electronic watermark is to be detected" **(Noridomi [0136]-[0140],**

Figure 7 element 706, Figure 8 elements 805-806; overlaid frame number

which represents the number of frames which have the same information

successively embedded is used as the embedment parameter and

represents scene change).

Consider Claim 12:

The combination of Noridomi and Oostveen teaches "the electronic watermark

embedding method according to claim 7, characterized in that in each of the Gap

detection step and the correlation detection step, any image data which is

included in the plural image data which constitute the electronic image from

which the electronic watermark is to be detected and which has disorder which

originates from the scene change is not used for the detection process

(Noridomi [0136]-[0140], Figure 7 element 706, Figure 8 elements 805-806;

overlaid frame number, which represents the plural image data [number of

frames which have the same information successively embedded], is used

as the embedment parameter and represents scene change; the difference

value is compared with a threshold, and the overlaid frame number is

increased when the difference is equal to or less than the threshold to

prevent image quality degradation, if it is greater, the embedment

parameter is reset to the original value).

Consider Claim 14:

Noridomi teaches "an electronic watermark embedding apparatus comprising"

(Noridomi [0101]-[0103], [0107], Figures 5 and 6) wherein the:

- a; "electronic watermark is embedded by using a method of dividing said

electronic image into which the electronic watermark is to be embedded into a

plurality of image regions spatially" **(Noridomi [0104], [0108], Figures 5**

element 504, Figure 6 element 601) and,

- b; "producing a variation between pixel values in one of said plurality of image

regions and those in an adjacent one of said plurality of image regions, and

varying the pixel values of said adaptive pixels of said plurality of image regions"

(Noridomi [0106], [0111]-[0113], Figures 5 element 503 and 505, Figure 6

element 606-608), "in a time direction according to a value of the embedded bit

set" **(Noridomi [0123]-[0126], Figures 7 and 8)**.

However, Noridomi does not teach

- a; "An electronic watermark detecting apparatus for detecting an embedded bit

set of an electronic watermark to be detected from an electronic image into which

the electronic watermark is embedded":

- c; "a Gap detecting unit for detecting, as a Gap value, a pixel value difference

corresponding to a pixel value variation in the time direction which is caused by

the electronic watermark embedding for each of said plurality of image regions of

said electronic image from which the electronic watermark is to be detected";

- d; "a correlation detecting unit for detecting a correlation value showing a

correlation between a pattern of the pixel value variation in the time direction

which is produced between the pixel values in the one of said plurality of image

regions and those in the adjacent one of said plurality of image regions, which is

caused by the electronic watermark to be embedded in said electronic image

from which the electronic watermark is to be detected, and a pattern of the pixel

value variation in the time direction of said electronic image from which the

electronic watermark is to be detected";

-e; "and an embedded bit determining unit for determining said embedded bit set

from results of the detection of said Gap value and the detection of said

correlation value for each of said plurality of image regions, and for judging

results of the determination complementarily so as to determine the embedded

bit set finally".

Oostveen teaches:

- a; "An electronic watermark detecting apparatus of detecting an embedded bit

set of an electronic watermark to be detected from an electronic image into which

the electronic watermark is embedded" **(Oostveen, page 3 lines 1-3, page 5**

lines 1-8, Figure 2 and 3; embedded bit set [robust signatures]),

- c; "characterized in that said electronic watermark detecting method comprises:

a Gap detection step of detecting, as a Gap value, a pixel value difference

corresponding to a pixel value variation in the time direction which is caused by

the embedding of the electronic watermark for each of said plurality of image

regions of said electronic image from which the electronic watermark is to be

detected" **(Oostveen, page 1 lines 11-17, page 3 lines 3-4, page 5 lines 4-10,**

Figure 2 and 3; gap value [payload]);

-d; "a correlation detection step of detecting a correlation value showing a

correlation between a pattern of the pixel value variation in the time direction

which is produced between the pixel values in the one of said plurality of image

regions and those in the adjacent one of said plurality of image regions, which is

caused by the electronic watermark to be embedded in said electronic image

from which the electronic watermark is to be detected, and a pattern of the pixel

value variation in the time direction of said electronic image from which the

electronic watermark is to be detected" **(Oostveen, page 3 lines 5-7, page 5**

lines 8-16, Figure 2 and 3; correlation between payload and signature

value);

-e; "and an embedded bit judgment step of judging said embedded bit set from

results of the detection of said Gap value and the detection of said correlation

value for each of said plurality of image regions, and judging results of the

judgment complementarily so as to determine the embedded bit set finally"

(Oostveen, page 3 lines 8-10, page 5, lines 15-26, Figure 2 and 3; inverse

functions are used in the decoding means to decode the embedded

watermark).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to combine the teachings of Noridomi with the teachings of Oostveen

because it is desirable to have a decoding operation for a watermarking encoding

operation. One of ordinary skill in the art, at the time of the invention, would have

been motivated to combine the teachings of Noridomi with the teachings of

Oostveen in order to develop a watermark dependent upon "a set of robust

features from the content of the host signal" in order to avoid attacks **(Oostveen,**

page 2 lines 1-6). The combination teaches providing for a unique set of

features for the video signal that would present an improvement in the detection

of signal to noise ratio **(Oostveen, page 2 lines 6-19)**.

Consider Claim 15:

The combination of Noridomi and Oostveen teaches "the electronic watermark

embedding apparatus according to claim 14, characterized in that the Gap

detecting unit calculates, as the Gap value, a difference between averages of

pixel values of two image data located in a vicinity of noted image data in the

time direction, the two image data being included in plural image data in the time

direction which constitute the electronic image from which the electronic

watermark is to be detected **(Oostveen, page 1 lines 11-17, page 5 lines 1-16;**

Noridomi [0110], [0119], [0134]-[0135], [0147]; Oostveen teaches calculating

a gap value [payload] and using an inverse signature-dependent function

to decode the message, while Noridomi teaches encoding by using the

average of pixel values of two image data located in a vicinity of noted

image data in the time direction [an average of luminance components for a

local region or frame] and calculating a difference).

Consider Claim 16:

The combination of Noridomi and Oostveen teaches "the electronic watermark

embedding apparatus according to claim 14, characterized in that the correlation

detecting unit sequentially calculates, as reference images, averages of pixel

values of image data located in a vicinity of noted image data in the time direction, the image data being included in plural image data in the time direction which constitute the electronic image from which the electronic watermark is to be detected" **(Noridomi [0128]-[0129], [0134]-[0136], [0147]; Noridomi teaches that the embedding method uses a correlation detection step between two images in a time direction [two selected image in a video, and determines the embedment parameter based on the difference in the sum of the luminance values for the two images] and teaches that the average of pixel values [average of luminance components] can be used for embedding as well)**, "and also calculates a correlation value showing a correlation between a pattern of variations in the pixel values of these reference image and a pattern of variations in pixel values of the electronic watermark to be embedded into the electronic image from which the electronic watermark is to be detected" **(Oostveen, page 1 lines 11-17, page 5 lines 1-16; Noridomi [0128]-[0135]; Oostveen teaches correlating the gap value [payload] and the robust signatures for decoding the message using an inverse function, while Noridomi teaches correlation by calculating the difference in the pattern of variation in the pixel values of the two images [characteristic amount])**.

Consider Claim 18:

Noridomi teaches "A program which causes a computer to function as an electronic watermark embedding apparatus comprising" **(Noridomi [0150], [0101]-[0103], [0107], Figures 5 and 6)** wherein the:

- a; "electronic watermark is embedded by using a method of dividing said electronic image into which the electronic watermark is to be embedded into a plurality of image regions spatially" **(Noridomi [0104], [0108], Figures 5 element 504, Figure 6 element 601)** and,

- b; "producing a variation between pixel values in one of said plurality of image regions and those in an adjacent one of said plurality of image regions, and varying the pixel values of said adaptive pixels of said plurality of image regions" **(Noridomi [0106], [0111]-[0113], Figures 5 element 503 and 505, Figure 6 element 606-608)**, "in a time direction according to a value of the embedded bit set" **(Noridomi [0123]-[0126], Figures 7 and 8)**.

However, Noridomi does not teach

- a; "A program which causes a computer to function as an electronic watermark detecting apparatus for detecting an embedded bit set of an electronic watermark to be detected from an electronic image into which the electronic watermark is embedded":

- c; "wherein said program causes said computer to function as a Gap detecting unit for detecting, as a Gap value, a pixel value difference corresponding to a pixel value variation in the time direction which is caused by the electronic

watermark embedding for each of said plurality of image regions of said

electronic image from which the electronic watermark is to be detected";

- d; "a correlation detecting unit for detecting a correlation value showing a

correlation between a pattern of the pixel value variation in the time direction

which is produced between the pixel values in the one of said plurality of image

regions and those in the adjacent one of said plurality of image regions, which is

caused by the electronic watermark to be embedded in said electronic image

from which the electronic watermark is to be detected, and a pattern of the pixel

value variation in the time direction of said electronic image from which the

electronic watermark is to be detected";

-e; "and an embedded bit determining unit for determining said embedded bit set

from results of the detection of said Gap value and the detection of said

correlation value for each of said plurality of image regions, and for judging

results of the determination complementarily so as to determine the embedded

bit set finally".

Oostveen teaches:

- a; "A program which causes a computer to function as an electronic watermark

detecting apparatus of detecting an embedded bit set of an electronic watermark

to be detected from an electronic image into which the electronic watermark is

embedded" **(Oostveen, page 3 lines 1-3, page 5 lines 1-8, Figure 2 and 3;**

embedded bit set [robust signatures]),

- c; "wherein said program causes said computer to function as a Gap detection

step of detecting, as a Gap value, a pixel value difference corresponding to a

pixel value variation in the time direction which is caused by the embedding of

the electronic watermark for each of said plurality of image regions of said

electronic image from which the electronic watermark is to be detected"

(Oostveen, page 1 lines 11-17, page 3 lines 3-4, page 5 lines 4-10, Figure 2

and 3; gap value [payload]);

-d; "a correlation detection step of detecting a correlation value showing a

correlation between a pattern of the pixel value variation in the time direction

which is produced between the pixel values in the one of said plurality of image

regions and those in the adjacent one of said plurality of image regions, which is

caused by the electronic watermark to be embedded in said electronic image

from which the electronic watermark is to be detected, and a pattern of the pixel

value variation in the time direction of said electronic image from which the

electronic watermark is to be detected" **(Oostveen, page 3 lines 5-7, page 5**

lines 8-16, Figure 2 and 3; correlation between payload and signature

value);

-e; "and an embedded bit judgment step of judging said embedded bit set from

results of the detection of said Gap value and the detection of said correlation

value for each of said plurality of image regions, and judging results of the

judgment complementarily so as to determine the embedded bit set finally"

(Oostveen, page 3 lines 8-10, page 5, lines 15-26, Figure 2 and 3; inverse

functions are used in the decoding means to decode the embedded

watermark).

It would have been obvious to one of ordinary skill in the art at the time of the

invention to combine the teachings of Noridomi with the teachings of Oostveen

because it is desirable to have a decoding operation for a watermarking encoding

operation. One of ordinary skill in the art, at the time of the invention, would have

been motivated to combine the teachings of Noridomi with the teachings of

Oostveen in order to develop a watermark dependent upon "a set of robust

features from the content of the host signal" in order to avoid attacks **(Oostveen,**

page 2 lines 1-6). The combination teaches providing for a unique set of

features for the video signal that would present an improvement in the detection

of signal to noise ratio **(Oostveen, page 2 lines 6-19)**.

Consider Claim 19:

The combination of Noridomi and Oostveen teaches "the program according to

claim 18, characterized in that the Gap detecting unit calculates, as the Gap

value, a difference between averages of pixel values of two image data located in

a vicinity of noted image data in the time direction, the two image data being

included in plural image data in the time direction which constitute the electronic

image from which the electronic watermark is to be detected" **(Oostveen, page 1**

lines 11-17, page 5 lines 1-16; Noridomi [0110], [0119], [0134]-[0135], [0147];

Oostveen teaches calculating a gap value [payload] and using an inverse

signature-dependent function to decode the message, while Noridomi

teaches encoding by using the average of pixel values of two image data

located in a vicinity of noted image data in the time direction [an average of

luminance components for a local region or frame] and calculating a

difference).

Consider Claim 20:

The combination of Noridomi and Oostveen teaches "the program according to

claim 18, characterized in that the correlation detecting unit sequentially

calculates, as reference images, averages of pixel values of image data located

in a vicinity of noted image data in the time direction, the image data being

included in plural image data in the time direction which constitute the electronic

image from which the electronic watermark is to be detected" **(Noridomi [0128]-**

[0129], [0134]-[0136], [0147]; Noridomi teaches that the embedding method

uses a correlation detection step between two images in a time direction

[two selected image in a video, and determines the embedment parameter

based on the difference in the sum of the luminance values for the two

images] and teaches that the average of pixel values [average of luminance

components] can be used for embedding as well), "and also calculates a

correlation value showing a correlation between a pattern of variations in the

pixel values of these reference image and a pattern of variations in pixel values

of the electronic watermark to be embedded into the electronic image from which

the electronic watermark is to be detected" **(Oostveen, page 1 lines 11-17,**

page 5 lines 1-16; Noridomi [0128]-[0135]; Oostveen teaches correlating the

gap value [payload] and the robust signatures for decoding the message

using an inverse function, while Noridomi teaches correlation by

calculating the difference in the pattern of variation in the pixel values of

the two images [characteristic amount]).

Conclusion

13.   The prior art made of record in form PTO-892 and not relied upon is considered

pertinent to applicant's disclosure.

   Kay et al., "Robust Content Based image Watermarking", Proceedings Workshop

   on Image Analysis for Multimedia Interactive Services, WIAMIS', May 2001.

   Kanai; Izumi et al., US 6278494 B1, Edge emphasis device, image forming

   apparatus using the same, image signal processing method, and image forming

   method using the same.

   Bodo, Yann et al., US 20040247154 A1, Method for the watermarking of a video

   sequence with adaptive selection of the watermark insertion zone, corresponding

   detection method, devices, data carrier and computer program.

   Kalker, Antonius Adrianus Cornelis Maria et al., US 20040250079 A1,

   Embedding and detection of watermark in a motion image signal.

Tehranchi, Babak et al., US 20020168069 A1, Copy protection for digital motion picture image data.

Tehranchi; Babak et al., US 6809792 B1, Spectral watermarking for motion picture image data.

Muratani; Hirofumi et al., US 6757405 B1, Digital watermark embedding device, digital watermark detection device and recording medium recording computer readable program for realizing functions of two devices.

Becker; Glenn et al., US 6049627 A, Covert digital identifying indicia for digital image.

Alattar; Adnan M. et al., US 7567721 B2, Digital watermarking of low bit rate video.

Levy; Kenneth L., US 6961444 B2, Time and object based masking for video watermarking.

Levy; Kenneth L., US 7197164 B2, Time-varying video watermark.

Yoshiura; Hiroshi et al., US 6711276 B1, Control method and apparatus for embedding information in data.

Nakamura; Takao et al., US 6185312 B1, Method for embedding and reading watermark-information in digital form, and apparatus thereof.

Rhoads; Geoffrey B., US 6381341 B1, Watermark encoding method exploiting biases inherent in original signal.

Rhoads; Geoffrey B., US 6307949 B1, Methods for optimizing watermark detection.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to TAHMINA ANSARI whose telephone number is 571-

270-3379. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone numbers

for the organization where this application or proceeding is assigned are 571-273-8300

for regular communications and 571-273-8300 for After Final communications. TC

2600's customer service number is 571-272-2600.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 571-272-

2600.

2624
/TA/
September 10, 2009

/Wenpeng Chen/
Primary Examiner, Art Unit 2624
9/11/09